

In the Abstract

Please substitute the following amended abstract in place of the originally-filed abstract:

~~An image sensor with a vertically integrated thin-film photodiode includes a bottom doped layer of a PIN photodiode imbedded in a dielectric layer, wherein a bottom surface of the bottom doped layer completely contacts its corresponding underlying pixel electrode. The bottom doped layers of the PIN photodiodes are formed by a self-aligned and damascene method, therefore the pixel electrodes are not exposed to the I-type amorphous silicon layer of the PIN photodiodes. Moreover, the transparent electrode connects the PIN photodiodes to an external ground voltage power through a ground pad which is a portion of a top metal layer.~~

An image sensor has a vertically integrated thin-film photodiode. In one implementation, the image sensor has a substrate, an interconnection structure adjacent to the substrate, wherein the interconnection structure includes a top metal layer comprising a plurality of first metal pads for thin-film photodiodes and a second metal pad for a ground pad, a dielectric layer with a plurality of first openings and a second opening disposed on the interconnection structure, a plurality of bottom doped layers with a first conductive type respectively disposed in the first openings, wherein each bottom doped layer contacts the corresponding first metal pad without extending outside the surface of the corresponding first metal pad, an I-type layer disposed over at least one bottom doped layer and the dielectric layer, an upper doped layer with a second conductive type disposed over the I-type layer, and a transparent electrode disposed over the upper doped layer and contacting the second metal pad through the second opening in the dielectric layer.